

REMARKS

The Examiner is thanked for the comments in the Action. They have helped us considerably in understanding the Action and in drafting this Response thereto.

It is our understanding that claims 1-7 remain pending in this application, wherein claims 5-7 have been amended for reasons specifically remarked upon, below, and claims 1-4 have been acknowledged by the Examiner as being directed to allowable subject matter.

Item 1 (Objections to the Specification):

The Examiner has correctly observed that the specification has informalities with respect to the character “(“ (symbol for opening parenthesis) appearing where the character “°” (symbol for degrees) was intended. Appropriate corrective amendment is made herein.

No new subject matter is added by these amendments.

Item 2 (§ 112, ¶2 & § 101 rejections of claims 5-7):

The Examiner has also correctly observed that the language of these claims recites uses without setting forth any steps. Appropriate corrective amendment is made herein.

No new subject matter is added by these amendments.

Item 3 (§ 103(a) rejection of claims 5-6):

Claims 5-6 are rejected as being unpatentable (obvious) over Meier, as best understood by the examiner. Applicant urges consideration of claims 5-6 as now amended, and respectfully suggests that maintaining this rejection would be error.

Regarding claim 5, the Action here states “*Meier (Fig. 1) discloses a method for spatial measurement where corner cube pairs 3.1, 3.2 et al are evenly distributed at opposite ends of the rotational axis A via connection with connecting rod 2.*” (underline added for emphasis here and elsewhere herein). However, Meier here actually only teaches one pair of retroreflectors 3.1 and 3.2, each mounted at an opposed end of connecting rod 2. In FIG. 1 this assembly is shown in two positions, at extremes depicting its range of useful motion. One such extreme is represented with the references 2, 3.1, and 3.2 while the other is represented with the references 2’, 3.1’, and 3.2’. Originating in Switzerland, where drafting practices may differ, Meier has not employed

the U.S. drafting convention of representing one position in solid outline and representing its second position in ghost outline. This appears to have lead to confusion in applying Meier here.

Accordingly, Meier does not teach what it was relied on for to support the present rejection. Applicant's claim 5 recites "*placing a rotary assembly of multiple cube corner pairs distributed evenly over the full circle,*" so what Meier actually does teach and what Applicant's claim 5 recites are clearly not the same.

Continuing, the Action states "*Meier, however, fails to explicitly disclose where the pairs are distributed over a full circle for uninterrupted measurement.*" There is no antecedent basis for the language "*the pairs*" based on Meier, so Applicant urges that it is more correct to say that 'Meier fails to explicitly disclose where pairs are distributed over a full circle for uninterrupted measurement.'

Continuing further, the Action next states "*Meier ... disclose[s] that the measurement range ... is dependent on [1] the size of the reflector, [2] the distance from the rotational axis A, and [3] the optical means with which the secondary measurement beam is produced.*" However, none of these is relevant to Applicant's claim 5.

From Applicant's specification (e.g., paragraphs [0030]-[0032], see also FIG. 2 and 3) it can be appreciated that limitations [1] and [2] in Meier are avoided by Applicant's use of multiple cube corner pairs. Using a larger number of pairs allows smaller cube corners to be used, thus reducing the ability of one to shadow another. Also, using multiple cube corner pairs makes the rotational axis distance irrelevant with respect to measurement range (but not measurement resolution, where using more cube corner pairs permits increasing the rotational axis distance and thus the ability to more precisely measure rotation).

As for [3] in Meier, this appears to be referring to inherent limitations in interferometry, such as the wavelength of light used and signal processing phase discrimination determining measurement resolution. As such, all processes using interferometry are subject to such limitations.

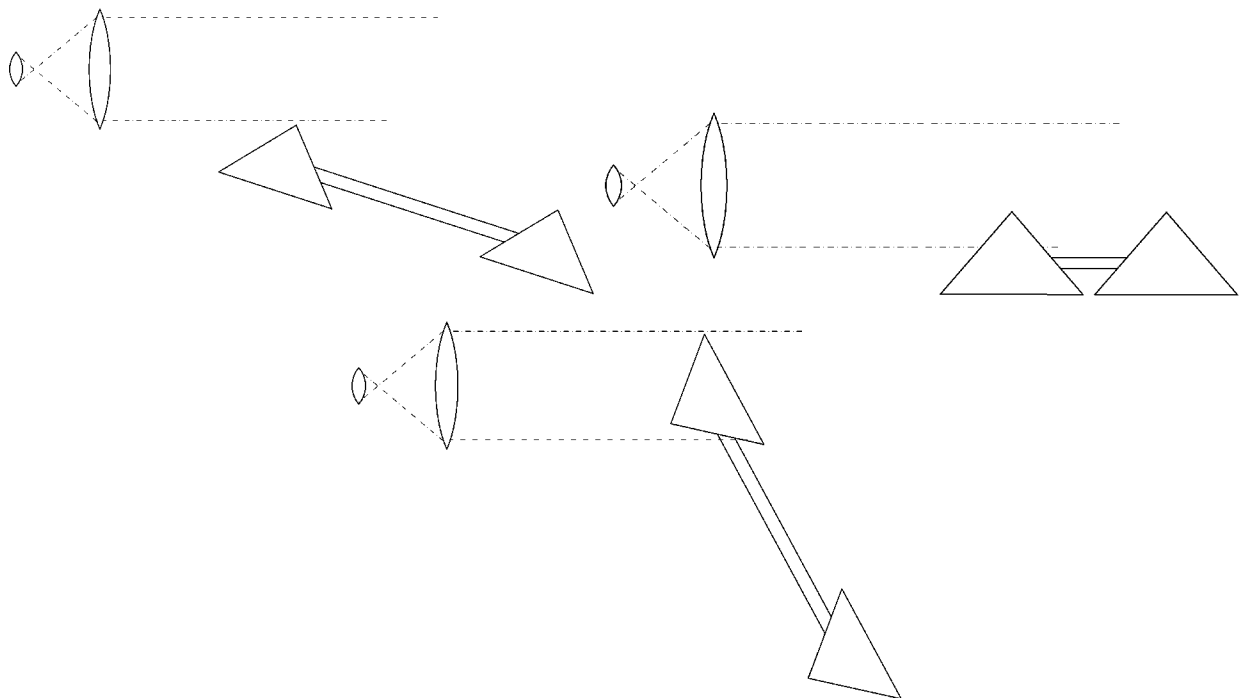
And continuing, the Action states:

Therefore, it would have been obvious ... to position the reflectors of Meier [4] close to the axis A [5] to enable distribution of measurements over a full circle rotation of the axis, the motivation being that such a positioning of the reflectors, along with the [6] appropriate beam expansion with beam widening optics 5.1, will enable uninterrupted interferometric measurement of the

displacement of the reflectors and the axis at any time, no matter what degree of rotation the axis undergoes at any time. (underline added for emphasis).

However, as discussed above, [4] is opposite Applicant's explicit teaching in the specification, and is entirely coincidental to claim 5 (where it is not recited). As a matter of design choice one could mount pairs closer, say, to physically avoid other nearby apparatus. But this would reduce resolution and increase shadowing between adjacent sets of pairs (or compel using a multi-plane arrangement, such as those Applicant shows in FIG. 3, 4, and 7).

As for [5], employing [4] would not accomplish this. Regardless of how close or how far apart Meier's single pair of retroreflectors 3.1, 3.2 are mounted on its connecting rod 2, such an assembly would never be capable of measurement over a full circle rotation. Below are some examples showing this:



And as for [6], if this is a necessary limitation in Meier, that alone supports patentability here (if for no other reason than the claim being an improvement over Meier), because it is not a necessary limitation of Applicant's claimed invention.

As for claim 6, Applicant first urges that it should be allowable for at least the reasons discussed above for parent claim 5.

Additionally, the Action here states "*Meier discloses that the target object has a known rotational center at axis point A, with the rotary assembly including corner cubes 3.1, 3.2 et al*

mounted coaxial to the center (see figure); since the rotational axis is known, measurement inherently occurs in a linear mode.” However, for the record, the figures of Meier (especially FIG. 1) do not support this. As can be seen in FIG. 1, the axis point A there is not coaxial with the large circle there (which has its axis where the large cross hairs intersect, about 2 mm to the right of point A). Thus, if the large circle represented an object to which the connecting rod 2 of Meier was attached, linear mode measurements would be quite inaccurate. [We doubt that Meier intended this and drafted FIG. 1 to show it, but it illustrates Applicant’s point.]

Item 4 (Allowable Subject Matter):

Applicant thanks the Examiner for the indication that claims 1-4 are allowable. Otherwise, this appears informational in nature and is understood to require no reply.

Applicant urges that claim 7 (objected to as dependant on a rejected base claim) should now also be allowable for at least the reasons discussed above for parent claim 5.

Item 5 (Conclusion):

This appears informational in nature and is understood to require no reply.

CONCLUSION

Applicant has endeavored to put this case into complete condition for allowance. It is thought that the objections and the § 112 / § 101 rejections have all been corrected by amendment, and that the § 103 rejections have been completely rebutted. Applicant therefore asks that all objections and rejections now be withdrawn and that allowance of all claims presently in the case be granted.

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